

## WASTE OUTLET PLUG

## FIELD OF INVENTION

The present invention relates to a combined plug and strainer for use in a waste, such as a sink or bath waste.

## 5 BACKGROUND OF INVENTION

It is known to use strainer members in combination with plugs in sink wastes, to prevent the entry of solid matter into the sink waste, which may otherwise block the waste outflow pipe. Such strainers are of particular use in 10 kitchen sinks, which are likely to have food particles and the like falling into the waste. Conventional strainers are typically in the form of a disc formed with a number of holes therethrough which is placed over the waste.

In certain variants of conventional strainers, the 15 disc is cupped in form, and includes upwardly extending peripheral walls. The shape of the strainer allows it to fit snugly into the opening of the waste outlet, and so improves the straining capability of the strainer.

The cupped form of strainer may also be provided in 20 combination with a plug. The plug is typically in the form of an elastomer body or ring which is mounted on the underside of the strainer. The plug and strainer normally are placed within the waste outlet such that the plug closes the outlet. Partial lifting of the strainer and plug 25 upwards separates the plug from the waste outlet and allows waste water to flow through the strainer to the waste

outlet, so capturing any solid matter in the strainer. The strainer and plug may then be simply lifted further from the waste outlet to remove the strainer and plug altogether, and to permit cleaning of the strainer.

5 However, such combined strainers and plugs suffer from a number of disadvantages. Chief among these is that the plug and strainer must be manually lifted and removed from the waste. This can prove difficult for many users, and in particular for users of restricted dexterity, who may not 10 be able to grasp the plug and strainer securely to permit removal; this may require considerable force, due to the weight of water tending to maintain the plug closed and the difficulty in separating the close fitting sealing surfaces.

15 Plugs which can be operated mechanically, for example lever operated or 'pop-up' plugs, which are more suitable for such users, are known; however it has not hitherto been possible to provide a mechanically operated plug in combination with a strainer which is suitable for operation 20 by persons of reduced dexterity. It is among the objects of embodiments of the present invention to provide such an arrangement.

#### SUMMARY OF INVENTION

According to the present invention, there is provided 25 a plug comprising a seal; a stem for being received in an outlet waste and coupled to the seal, the stem being

selectively adjustable in length for selectively engaging the seal with a portion of an outlet waste to open and seal an outlet waste; and a strainer member coupled to one of the seal and the stem.

5        Thus, the present invention provides a plug which may be opened and closed simply by varying the length of the stem, and which is provided with a strainer member. In certain embodiments of the invention, the stem is arranged to be variable in length in response to an axial force 10 exerted on the stem; this allows the plug to be opened or closed simply with a downwards push on the plug, such that the plug is suitable for use by persons of restricted dexterity.

A plug according to certain embodiments of the present 15 invention may in use define three working positions - closed; open and straining; and fully removed. Further, the manner of opening the plug by means of the stem provides a system whereby a user does not need to exert undue force against the weight of water to open the plug. This provides 20 a range of working conditions which has not hitherto been possible with conventional strainer plugs, and makes the plug more suitable for use by persons of restricted dexterity.

Preferably the stem defines a vertical axis, and 25 extends axially downwardly of the seal, with the strainer being located axially upwardly of the seal. Thus, in use

the strainer will be located uppermost in the plug assembly, with the seal being located below the strainer within the waste outlet. This configuration allows the user to obtain ready access to the strainer portion of the plug 5 for cleaning and maintenance. This arrangement has not hitherto been possible with conventional mechanically actuated plugs. Preferably the strainer in use in a closed position is located flush with or below a waste outlet; this provides an aesthetically-pleasing arrangement as well 10 as avoiding obstructing use of the sink or receptacle in which the plug is located.

In alternative embodiments, the seal may be located axially upwardly of the strainer, such that the strainer is located in use below the seal. This allows the seal to be 15 made larger to fully seal a waste opening, while the strainer may be located within the waste.

Preferably the strainer is removable from the stem or the seal to which it is attached. This allows the strainer to be removed for cleaning or maintenance while still 20 permitting regular use of the seal arrangement.

Preferably the strainer is configured to conform to the shape of an opening of a waste outlet; the strainer will thus be received snugly within the waste outlet.

Preferably the plug further comprises a surface for 25 contact with a user's hand. The surface is conveniently in the form of a pad or button, and provides a portion of the

plug which a user may depress in order to selectively alter the length of the stem. The surface may be provided on a portion of the plug which is formed to permit grasping thereof; this allows a user to grip or grasp the surface 5 for removal of the plug from a waste or the like. The surface may also or instead be provided on a portion of the plug which is arranged to retain the strainer and/or the seal on the stem; in such embodiments, the surface may be removable from the plug to permit disassembly of the plug.

10 In further embodiments of the invention, the surface may be in the form of a pad dimensioned to substantially cover a waste outlet opening; this serves to conceal the strainer and seal and allows for decorative finishes to be applied if desired.

15 Preferably the stem comprises two substantially concentric portions biased to a first length by means of a spring or the like. The stem may further comprise a latch means arranged to hold the portions in a second length against the spring bias. Application of a force to the plug 20 may cause the latch to engage or disengage, so altering the length of the stem. Preferably the stem may be either extended or contracted by the application and release of a force in a single direction. That is, the plug may be switched from open to closed positions, and vice versa, by 25 for example pushing down on and then releasing the plug. Thus, no complex movements are necessary to operate the

plug.

Preferably the stem length may be varied by the application of less than around 5 lbs (2.2 kg) of force; this level of force may be exerted by a substantial 5 majority of users, even those of restricted dexterity, and so presents little difficulty in the operation of the plug.

Preferably the seal is resilient, and preferably comprises a resilient material; conveniently elastomer. The seal preferably comprises a circular flange which in use 10 engages with a portion of a waste outlet.

Preferably the stem is adapted to be secured to an outlet waste; alternatively the stem may be freely received in an outlet waste. This second arrangement permits the entire plug assembly to be easily removed for cleaning or 15 maintenance. In certain embodiments the stem comprise means for selectively securing the stem to an outlet waste; for example, the stem may include a threaded member normally covered with a non-threaded sleeve; the stem will normally be freely received within the outlet waste. Removal of the 20 non-threaded sleeve exposes a threaded member allowing the stem to be secured to a threaded portion of a waste.

The plug may be provided in combination with a waste outlet.

#### BRIEF DESCRIPTION OF THE FIGURES

25 These and other aspects of the present invention will now be described by way of example only and with reference

to the accompanying Figures, in which

Figure 1 shows a top view of a plug in accordance with an embodiment of the present invention in combination with a waste;

5 Figure 2 shows a sectional side view of the plug and waste of Figure 1; and

Figure 3 shows a sectional side view of an alternate embodiment of a plug in accordance with the present invention.

#### 10 DETAILED DESCRIPTION OF THE FIGURES

Referring to Figures 1 and 2, these show a combination strainer and seal plug 10 in accordance with an embodiment of the invention. The plug 10 is shown in combination with a waste outlet 12, which includes an interior surface portion 14 and an exterior shell 16. The shell 16 includes a threaded portion 18 for connection to a waste pipe system.

The plug 10 itself includes a two-part plastics stem 20a, 20b, the lower portion of which carries a protrusion 22 which is received within an externally threaded sleeve 24 coupled to the portion 14. The threaded sleeve 24 passes through a corresponding opening in the shell 16, and a nut 39 secures the interior surface portion 14 to the exterior shell 16, thereby trapping a sink or the like between upper flange portions of the interior surface portion 14 and the exterior shell 16.

On the upper portion 20a of the plastic stem is threadedly mounted a ring 26 which carries an elastomer seal member 28 and a strainer member 30. The strainer member is generally circular and cup-shaped, and includes a 5 peripheral wall 34 and a number of openings 36. The cup shape of the strainer 30 allows it to sit flush with the waste opening 12, as can be best seen in Figure 2.

Above the ring 26 and also threadedly mounted to the plastic stem 20a is a knob 32. The knob is of relatively 10 large diameter compared with conventional plugs, and so is easier to grip for users. The knob may be removed from the stem to permit removal of the ring 26 and either or both of the strainer 30 and seal 28, for maintenance and cleaning.

In use, the plug 10 may be operated as follows. The 15 plastic stem 20a, 20b includes a compression spring and a cam track and stop member (not shown). The lower portion of the stem 20b is telescopically received within the upper portion 20a, and the compression spring biases the lower portion 20b towards an extended position.

20 Exertion of pressure on the stem 20a, 20b by means of a user pressing down on the knob 32 compresses the stem and allows the stop member to engage with the cam track in a first stop position. This retains the stem in a compressed position against the bias of the spring. In this position 25 the seal 28 is in engagement with the inner portion of the waste outlet 14, such that the outlet is sealed.

To separate the seal from the outlet 14 and to allow water to drain through the waste, the user presses on the knob 32 once more. The stem is compressed again, and the stop member is released from the first stop position. The 5 spring pushes the stem to an extended position, and the stop member moves along the cam track to engage in a second stop position. The seal 28 is thus spaced from the outlet surface (in the position shown in Figure 2) to permit water to drain through the waste; the presence of the strainer 30 10 ensures that water first has to pass through the strainer which removes large particles such as food from the draining water.

Referring now to Figure 3, this shows a sectional side view of an alternate embodiment of the present invention. 15 In this embodiment, the seal 128 is located above the strainer 130. The seal 128 will thus engage in use with an upper flange of a waste outlet (not shown) to seal the plug. The knob 132 is sized to conform with a waste outlet opening, and will in use conceal the seal 128 and strainer 20 130 from a user's view. The knob 132 may be made of a decorative material, to provide an improved aesthetic appeal for the plug. This larger size of knob may of course be used with the embodiment of Figures 1 and 2 if desired.

The plastics stem 120a, 120b of this embodiment 25 carries a protrusion 122 which in normal use is slidably received into a sleeve of the waste outlet (not shown), to

locate the plug within the waste outlet. The protrusion 122 is threadedly attached to a threaded lower portion 140 of the stem 120b; the protrusion may thereby be removed if desired to expose the threaded portion 140. This threaded portion 140 may then be threadedly engaged with a correspondingly-threaded sleeve (not shown) provided on a waste outlet to secure the plug in the waste outlet. This is of benefit if a user wishes the plug to be non-removable from the waste outlet. Again, this variant may be used with 10 the embodiment of Figures 1 and 2 if desired.

It can be seen that the present invention provides a mechanically-operable plug arrangement which includes a strainer and which can be operated by persons of reduced dexterity, since limited force and simple movements are 15 required to open or close the plug, even when the plug must be opened against the weight of water. The plug may also in certain embodiments be removed altogether from the waste; the knob on the upper surface of the plug allows this to be accomplished relatively easily. The location of the 20 strainer on an upper portion of the plug in certain embodiments allows for ready access to the strainer for cleaning, while the seal and/or the strainer may be disassembled from the plug in certain embodiments if desired.

25 The plug may be so constructed as to have the strainer lie flush with or below the waste outlet in the open and

closed positions.

It will be understood that the foregoing is for illustrative purposes only, and that the skilled person will be able to conceive of variations which may be made to 5 the described embodiment, without departing from the invention. For this reason, the scope of the invention should be determined with reference to the appended claims.